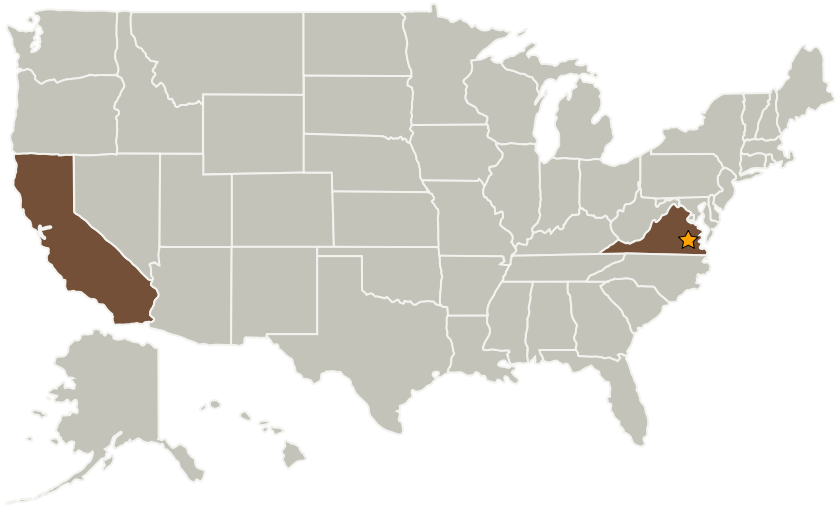
Ultrasensitive Mid-Infrared In Situ Spectrometer for Planetary Atmospheric Analysis, Phase II

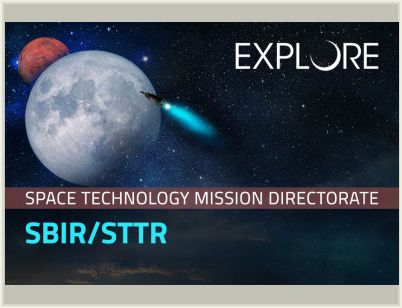
Completed Technology Project (2004 - 2006)

Project Introduction

The Small Business Innovative Research Phase I proposal seeks to develop a compact, robust in situ spectrometer capable of detecting multiple gas-phase species in planetary atmospheres with ultra-high sensitivity and selectivity. This instrument will employ a novel room-temperature, widely tunable mid-infrared laser source in conjunction with cavity ringdown spectroscopy. During Phase I, both the novel laser and the cavity ringdown technology were demonstrated in the 3.3 micron spectral region. During Phase II, a flight-ready instrument will be constructed, enabling access to a variety of species, including methane, ethane, ammonia, and formaldehyde. The ultra-high sensitivity of the proposed system will enable these species to be detected at concentrations below 7*10^7/cm^3 per minute, which corresponds to a detection limit of <30 pptv in Earth's atmosphere. The unique laser source to be constructed in Phase II will also be capable of being integrated into other spectroscopic platforms, in many cases providing a direct replacement for cumbersome cryogenic diode lasers while at the same time significantly improving the spatial mode quality and increasing spectral coverage.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Novawave Technologies	Supporting Organization	Industry	Redwood City, California

Primary U.S. Work Locations	
California	Virginia

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Lori B Garver

Principal Investigator:
S. Cheng

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers